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ABSTRACT

A newer discipline called environmental psychology has begun to study the effects of noise, particularly on task performance and reactional behavior. In the 1970's college dormitories liberalized their living conditions; this led to fewer quiet hours. College students may not move off campus to find a quiet environment for studying. Dormitory students deal with the noise by studying elsewhere or drowning out outside noise with their own stereo or television. It was hypothesized that college students attempting to study under various audio environments would evaluate material and author less favorably and make more errors as their ability to control the environment decreased. Female subjects (N=64) volunteered. A dormitory situation was simulated with recorded noises: (1) dormitory noise; (2) rock and roll music; (3) television; (4) bird sounds; and (5) silence. Subjects were given a psychology chapter to read. The participants rated their evaluations of the informativeness of the chapter, the quality of the writing, their liking of the chapter, and their liking of the author. Quiz performance was scored. The results showed that the dorm noise group scored significantly lower in all comparisons. Rock and roll and television noise did not affect comparisons. This research might point out the need for dormitories to be quiet in order to ensure quality of study. A floor plan of the simulated dorm used for the experiment is included. (ABL)

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Collegiate Learning and the Dormitory Environment: Relative Effects of Dorm Noise, Rock and Roll, Television Audio, and Sounds of Nature

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Collegiate Learning and the Dormitory Environment

Abstract

Sixty-four female college students attempted to study for a Tests and Measurements examination in a simulated dormitory. During the 30 minute study period, five environmental conditions were created via pre-recorded audio cassettes: actual dormitory noise, rock and roll music, television audio, birds chirping, and silence. Subjects in the dorm noise condition were significantly more negative in their evaluations of the quality of writing, liking for the chapter, and anticipated liking of the author. Group differences in number of test errors and informativeness about the subject were directionally supportive of the hypotheses.

Collegiate Learning and the Dormitory Environment: Relative Effects of Dorm Noise, Rock and Roll, Television Audio, and Sounds of Nature

Since about 1970, the emerging discipline of environmental psychology has investigated the effects of noise on human behavior. Dependent measures have tended to fall into two categories: (1) effects of noise on task performance, and (2) effects of noise on victim reactions (e.g., sense of frustration, stress and relative ability to cope).

Findings with respect to task performance tend to be mixed. For example, Smith and Broadbent (1980) report no effects of noise on performance on embedded figures tasks. Jerison (1959), however, found detrimental effects due to noise on subjects' level of alertness, ability to judge the passage of time, and performance on a mental counting task. In summarizing the studies dealing with the effects of noise on performance, Bell et al. (1978) suggest five determining factors: predictability, intensity, type of task, stress tolerance of the individual, and other personality characteristics.

A second effect of noise on human behavior relates to the ability of individuals to cope with such an environment. Ittelson et al (1970) report noise tolerance to be a subjective phenomenon, ranging from successful habituation to stress and withdrawal in social relations. Adaptation seems to be most successful when the noise is of an ongoing nature, and thus predictable (Leff, 1978). In attempting to reconcile these somewhat mixed findings, Bell et al (1978) have suggested task complexity as a factor which mediates both performance and frustration.

One setting where performance on complex cognitive tasks is often subject

to unwanted audio intrusion is the college dormitory. Liberalization of dormitory living conditions in the 1970s brought about extended dorm hours, new male-female visitation regulations, and attempts to make dormitories more residential and less institutional in character. One concomitance of this new policy, however, has reportedly been an increase in general noise level, and a decrease in predictability of "quiet hours."

Anecdotal evidence from the author's institution suggests that "partying" during the week has increased, and that serious students have experienced considerable frustration in attempting to cope with consistently high academic demands in an increasingly noisy environment. In contrast with the motivations of previous generations, some college students are apparently moving "off campus" in order to live in an environment more conducive to academic needs.

On-campus students report two methods which have evolved to cope with dormitory noise: retreating and masking. Those who choose to retreat report "hiding out" in classroom buildings or such areas as the psychology lab during evening hours in order to find the necessary quiet for their work. Those who choose "masking" resort to playing a stereo or TV set at sufficient volume that it blocks out awareness of outside noises. While perhaps less desirable as a study environment than a quiet room, this latter technique does deal with the three major dimensions which Bell et al. (1978) identified as influencing the annoyance characteristics of noise: volume, predictability, and perceived control.

Research indicates that noise can, indeed, interfere with academic learning. Ittelson et al. (1974), in summarizing research by Cohen, Glass, and Singer, report decrements in reading skills for children living on lower levels of an apartment complex subjected to the sounds of heavy expressway

traffic. Children residing on the upper floors of the 32-story buildings, not subjected to the same traffic noise level, obtained higher scores. Similarly, Cohen and his associates (Cohen et al, 1980; Cohen et al, 1981) report two studies documenting the negative effects of aircraft noise on children's learning abilities and cognitive strategies.

One question that has not been examined directly relates to affect toward the academic environment and its associated materials. It is commonly believed that one response to failure and frustration is to blame the teacher or materials ("a poor craftsman quarrels with his tools"). This explanation has sobering potential consequences for the collegiate academic experience, among whose most fundamental goals is the development of a life-long love for books, personal wisdom, and the learning process.

Experimental Hypotheses

The following hypotheses were derived from the preceding discussion and were investigated in a laboratory experiment. Specifically, college students attempting to study under varying audio environments were predicted to:

1. evaluate collegiate materials less favorably as their ability to control the study environment decreased.

2. demonstrate a similar tendency in their evaluation of the author of these materials.

3. make more errors on a test of materials studied as ability to control the environment decreased.

Method

Experimental Design

Environmental background was manipulated within the framework of a five cell, one way classification design. Subjects attempted to study college-level materials in preparation for an examination under differing types of

prevailing ecological conditions: actual dormitory noise, rock and roll music, television audio, sounds of nature (birds), and a control condition (silence). Major dependent measures subsequently assessed included: a) subjects evaluations of the quality of the reading materials, b) their enjoyment of these materials, c) their affective evaluations of the author, and d) their performances on a multiple choice test covering the assigned chapter.

Subjects

Sixty-four female college students, primarily freshmen and sophomores, volunteered to participate in the study. Virtually all participants were currently enrolled in General Psychology, and received one point toward their final grades.

Procedure

Subjects were recruited for a one hour "Learning and Environment Study" from two sections of General Psychology by means of a sign-up sheet. They were then scheduled to report to the Psychology Lab, a large suite of rooms of various sizes, including eight small, 5½ ft. x 7 ft. (1.68 x 2.13 m.) research rooms.

Two senior psychology majors, members of a class in Advanced Social Psychology, shared the role of experimenter, running equal numbers of subjects in all conditions. Participants were scheduled in groups of six to eight. When all had arrived, they were led into a combination small classroom-psychology lounge area and seated in desk chairs. The experimenter then explained the study in the following manner for all subjects:

I'd like to thank you all for coming today. It's a tough time of the term to conduct research, but we've got an experiment that should be relevant to everyone here at Hendrix. As most of you know, the ability of people to study successfully in the Hendrix dorms has become a "hot issue" this year.

Furthermore, the question of environmental impact on ability to learn is a topic with ramifications far beyond our campus. Therefore, the members of the Advanced Social Psychology class have chosen to research the effects of environmental stimulation on academic learning.

Down the hall we've created our own simulated dorm hall, Mills Alley. In a minute I'm going to ask you to enter your "room" to study for an upcoming exam. You'll each be given a separate room in our dorm, complete with table and chair, and situated off a main hallway.

Here's the situation: You are a student in a class in Tests and Measurements. Like most students, you feel the pressures of college life -- too much work to do and not enough time to do it in. Unfortunately, you have only 30 minutes to prepare for a major quiz on Chapter 15, which you have not previously so much as looked at. You've gone back to your dorm room to attempt to get ready for the test. After you've had 30 minutes to read the material, you'll actually be tested on the chapter.

While you're in the process of studying, you may be subjected to noise or sounds which typify the environment in many dorms. Some dorms are noisy, some quiet; some are located in urban areas, some in rural; some students attempt to mask outside sounds by playing the TV or stereo, others do not. Your task is simply to prepare for your exam in spite of any potential environmental impact, using whatever study strategy you wish. You may not, however, leave your dorm room until the 30 minute study period is over. Any questions?

You'll find a copy of Chapter 15, on which you will be tested, on the table in your dorm room. Please do not look at it until you are in your dorm room and the time to study is announced. There are scratch pads available in the rooms, together with pencils, underliners, etc., so that you can study in whatever way you feel most comfortable. You can even mark up the copy of the chapter if you wish. Following the 30 minutes, you'll go to your classroom without any notes for the exam. Okay, last chance for questions. (The experimenter answered any questions during this explanation by repeating or paraphrasing the original instructions).

After receiving these instructions, subjects were taken to the "dorm hall," and allowed to select their own "dorm rooms," from among the eight small rooms opening onto the hallway (see Figure 1).

Insert Figure 1 about here

Dormitory simulation. The upper end of the dorm hall had a large bulletin board containing information about current campus social events,

intramural sports, academic and social regulations, and future dorm meetings. These materials were currently posted in dormitory hallways throughout the campus.

Each simulated dorm room had a chair and table, a large live green plant, milkcase bookcases with textbooks, the current copy of the school newspaper, and assorted memoranda relating to college social activities and dormitory information. The walls of the simulated dorm rooms were decorated with posters and current record album covers. A variety of study materials was provided. The overall effect of this multi-room conversion was striking, closely creating the ambience of a college dormitory to most observers.

After all subjects were seated comfortably in their individual rooms, the Experimenter, speaking from the hallway, gave these last minute instructions:

> Please make every effort to prepare thoroughly for the exam. You may leave your doors open or closed as you choose. Okay, begin your 30 minute study period.

Manipulation of study environment. Exactly 15 seconds after subjects commenced studying (with the exception of the no sound, control condition), a pre-recorded audio cassette was started and continued to play throughout the time designated for the exam review. The tape deck was located in an adjoining study space, and fed the sound to two speakers located at opposite ends of the "dorm hallway" (see Figure 1). Volume level was equalized for the four tapes.

Five levels of the independent variable, environmental background, were created:

(1) Dormitory Noise: an actual recording of sounds made in a co-ed college dormitory. This recording was made outside a student's room, picking up a wide variety of common dorm activities including passing conversations,

doors opening and closing, occasional shouts and laughter, and random sounds from other rooms.

(2) Rock and Roll: a collection of relatively obscure rock and roll music, mostly from the late 1960s and early 1970s. The music was typical of "alternative" rock and roll programming offered by many college radio stations (definitely not "Top 40"). Most musical selections were by groups, up-tempo, with vocals. Almost all songs would have been unfamiliar to our subjects, the likely exceptions being one selection by the Rolling Stones and two by the Beatles.

(3) Television: The sound tracks from episodes of "Happy Days" and "Laverne and Shirley," together with whatever advertisements and station promotions happened to occur during this time period. A sampling of commercials on this tape would include Mountain Dew soft drink, Hellman's Mayonnaise, Pina Colada Tanning Lotion, and A & W Root Beer.

(4) Birds: selections from a recording designed for use by radio stations to create desired background effects. The tape consisted of bird sounds made deep in the woods. It featured the gentle chipping and chirping of small birds, with an occasional deeper hoot audible, apparently some distance from the microphone. Although the recording is continuous, presumably as different birds come and go, there is little variation apparent to the listener. The overall effect is typically calming and perhaps mildly invigorating.

(5) Silence: No tape was played in this condition. Since the suite of rooms in the Psychology Lab is sound-deadened and removed from the main traffic patterns of the building, the feeling of quiet was substantial.

After initiating the environmental induction, the experimenter carefully timed the study period. Subjects wrestled with the complexities of Anne

Anastasi's textbook, Tests and Measurements, 4th edition. Each participant received an unmarked, xeroxed copy of Chapter 15, "Occupational Testing," consisting of 28 pages of difficult, unfamiliar material.

After exactly 30 minutes, the experimenter directed the subjects to stop reading. They were then told to leave all materials in their dorm rooms, refrain from discussing the chapter, and return to the classroom for their quiz.

Dependent measures. After all participants had returned to the classroom, the Experimenter distributed a four page questionnaire. The first 34 questions, multiple choice items taken directly from the instructor's manual, constituted a quiz on the chapter from Anastasi. Subsequent questions were 7-point Likert scale items which asked subjects to assess a) how informative the chapter was about the subject, b) how well written the chapter was, c) how much they liked the chapter, and d) how much they would anticipate liking the author, Anne Anastasi. The final two items dealt with prior familiarity with the chapter's content, and possible suspicion during the experiment. Subjects were thanked for participating, requested not to discuss the study except in generalities for at least two days, and promised a full presentation of the results in one week. Since no deceptions were involved, subjects were dismissed as a group when all had completed the questionnaire.

Results

Data from three of the 64 subjects were eliminated prior to analysis because of failure to read the required chapter during the study period or failure to properly complete the questionnaire. No subject indicated prior familiarity with the topic of the chapter, Occupational Testing.

Table 1 presents subjects' mean ratings of the chapter and author,

Insert table 1 about here

together with average scores on the 34-item multiple choice test. Chapter and author ratings were derived from scores on 7-point bipolar Likert scales.

For all comparisons among groups, it was hypothesized that the following ordering would obtain: Dorm Noise lowest or most negative, TV and Rock and Roll (both serving masking functions) intermediate, Birds and Control highest or most positive.

Evaluative Judgments

Subjects' judgments of how informative the chapter was are indicated in the first column of means in Table 1. The ordering of scores is directionally supportive, but the means are not significantly different ($F = 2.25$, n.s.).

Ratings of how well subjects felt the chapter was written are indicated in means column 2. Means for this comparison were significantly different by F-test ($F = 5.50$, $p < .01$). A subsequent orthogonal comparison indicated the Dorm Noise Condition as significantly more negative in evaluation than the other four conditions ($t = -2.26$, $p < .05$).

Affective Judgments

Subjects were asked how much they liked the chapter, and their mean responses are indicated in the third column. A significant difference was noted among the means ($F = 4.79$, $p < .01$), again attributable solely to the low scores of the Dorm Noise condition ($t = -3.99$, $p < .001$ for orthogonal comparison).

"The author of this chapter, Anne Anastasi, is a well recognized authority on psychological testing. Based on this reading, how much would you anticipate liking her?" When asked this question, subjects responded with

the scores shown in the fourth column of means. Once again, the pattern was the same, a significant difference occurring among mean scores ($F = 3.97$, $p < .01$), due to the significantly lower anticipated liking of the Dorm Noise subjects. This orthogonal comparison yielded $t = -3.62$, $p < .001$.

Test Performance

The performance of subjects on the 34-item multiple choice exam showed the same directional tendency, as indicated in the last column of Table 2, with the Dorm Noise group faring poorest. However, these means are not significantly different from one another ($F = 2.19$, n.s.).

Discussion

The overall pattern which emerges from this experiment is clear and disturbing. The Dorm Noise group scored lower than all other conditions in every one of the five major comparisons, significantly so in three of the five. If Dorm Noise subjects show consistently negative attitudes and relatively poorer performance in a one hour simulation of residence hall life, one shudders to think of the long term consequences of exposure to environmental interference of this type.

While all groups dealt with the same task and same time pressures, presumably equalizing non-environmental stress, only the Dorm Noise subjects were faced with sound that was both unpredictable and subject to large volume change, two of the major factors identified by Bell (1978) as negative determinants of task performance. Dorm noise may be perceived as pleasant and even welcomed on a Friday night or Saturday afternoon, when social desires are foremost. Such noise becomes difficult to deal with, however, when academic pressures return.

Subjects coped quite well with the rock and roll music and the TV audio. Perhaps they have developed over the years the ability to function under such

a background. Whether used as background, as a masking technique for unwanted sound, or as a means for bringing some enjoyment to academic tasks perceived as dull or repetitious, many subjects reported listening to the TV or stereo frequently and as far back in their lives as late elementary schools. Volume level remains relatively constant and the sound is predictable. One wonders, however, how those who dislike rock and roll might perform, or how rock fans might fare attempting to study under atonal music or free form jazz.

Since most previous research has concentrated on performance, the evaluative and affective judgments of subjects are of particular interest in this study. Mathews and Canon (1975) found that subjects exposed to 85-db white noise were less likely to help a person in need of assistance, even if the person had his arm in a cast. While not personally favoring such an interpretation, the authors note that noise effects on subject mood could account for such results. Similarly, dorm noise effects on subject mood might account for the lower evaluative and affective ratings in this experiment. Dorm noise subjects may have vented their frustrations on the text selection and author.

A possible alternative explanation of these results might invoke the potential influence of demand characteristics (Orne, 1962) on subjects' behavior. This rival hypothesis seems plausible at first, given that only the Dorm Noise group behaved in a significantly different manner. However, if participants had been motivated to be "good subjects" and help confirm the perceived experimental hypotheses, the data produced by the TV and Rock and Roll subjects would have been similar to, not different from, that of the Dorm Noise group. All three conditions should have appeared to subjects as situations which inhibit effective learning. Further, no participants showed or expressed any such tendency to "second guess" the purpose of this study.

Most appeared caught up in the novelty of our simulation, and seemed to respond genuinely to the tasks as presented, rather than as they hypothesized they were expected to behave.

This simulated dormitory technique seemed to work quite well, and certainly would prove appropriate to additional investigations in this area. The fact that no deceptions are necessary makes the setting especially attractive. Nevertheless, future research might also consider field alternatives to this approach. Dormitory analogues of the 32-story buildings discussed earlier undoubtedly exist. One might look for random assignment of students to dormitories in an urban institution, hoping to find some dorms located on a noisy street with other comparable residence halls located in a quieter section of the campus. Actual academic performance, together with attitudes toward learning could be assessed.

As "future shock" (Toffler, 1970) brings increased pressures to cope with both explosions of learning and life styles, the implications of this study take on added importance. Colleges have traditionally been quiet havens of learning, analysis, reflection, and synthesis of ideas. It appears that colleges must safeguard such environments so that these cognitive processes may proceed, if frequently-cited goals such as love of knowledge for its own sake and life-long learning are to be realized.

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Footnotes

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Table 1

Mean Ratings of Chapter and Author

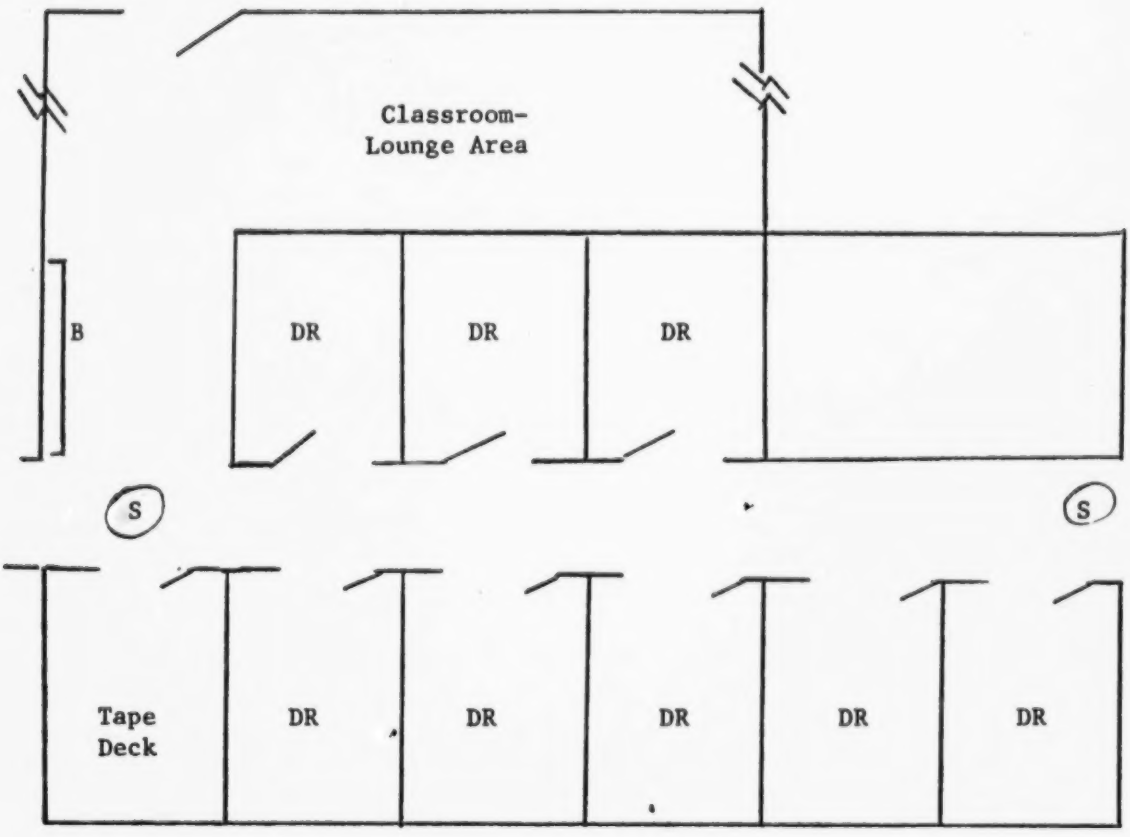
and Scores on Multiple Choice Exam

Condition	N	Mean Chapter and Author Ratings				Mean Correct on Exam
		Informative	Writing	Chapter	Author	
Dorm Noise	14	3.62[a]	2.61	1.14	2.68	14.36
TV	12	4.71	4.71	2.88	4.04	15.75
Rock and Roll	11	4.82	4.73	3.55	4.55	16.00
Birds	13	4.58	3.38	2.73	3.65	17.69
Control	11	5.14	4.27	2.45	4.41	16.00
Overall	61	4.54	3.87	2.49	3.80	15.93

[a] n = 13 for this mean only

Figure Caption

Figure 1. "Mills Alley" Dormitory Hall



DR = Dorm Rooms

S = Stereo Speaker

B = Bulletin Board